

minutes; extreme velocities are gusts of shorter duration, and are not given in this table):

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
		<i>Miles</i>				<i>Miles</i>	
Amarillo, Tex.	21	52	w.	Fort Canby, Wash.	7	52	se.
Atlantic City, N. J.	22	52	no.	Havre, Mont.	16	54	sw.
Block Island, R. I.	22	57	e.	Huron, S. Dak.	19	50	se.
Do.	23	73	no.	Jupiter, Fla.	5	51	se.
Do.	12	60	no.	Kittyhawk, N. C.	3	60	e.
Buffalo, N. Y.	14	50	sw.	New Haven, Conn.	6	56	no.
Do.	23	59	w.	New York, N. Y.	6	60	e.
Do.	27	54	w.	San Antonio, Tex.	23	60	n.
Charleston, S. C.	6	56	se.	Tatoosh Island, Wash.	11	54	nw.
Chicago, Ill.	21	51	e.	Do.	15	60	w.
Cleveland, Ohio.	23	57	w.	Williston, N. Dak.	16	60	nw.
El Paso, Tex.	6	57	sw.	Winnemucca, Nev.	5	50	sw.
Do.	19	56	sw.				

SUNSHINE AND CLOUDINESS.

The quantity of sunshine, and therefore of heat, received by the atmosphere as a whole is very nearly constant from year to year, but the proportion received by the surface of the earth depends upon the absorption by the atmosphere, and varies largely with the distribution of cloudiness. The sunshine is now recorded automatically at 22 regular stations of the Weather Bureau by its photographic, and at 36 by its thermal effects. At one of these stations records are kept by both methods. The photographic record sheets show the apparent solar time, but the thermometric records show seventy-fifth meridian time; for convenience the results are all given in Table X for each hour of local mean time. In order to complete the record of the duration of cloudiness these registers are supplemented by special personal observations of the state of the sky near the sun in the hours after sunrise and before sunset, and the cloudiness for these hours has been added as a correction to the instrumental records, whence there results a complete record of the duration of sunshine from sunrise to sunset.

The average cloudiness of the whole sky is determined by numerous personal observations at all stations during the daytime, and is given in the column "average cloudiness" in Table I; its complement, or percentage of clear sky, is given in the last column of Table X.

Difference between instrumental and personal observations of sunshine.

Stations.	Apparatus.	Total possible duration for the whole month.	Personal estimated area of clear sky.	Instrumental record of sunshine.			
				Photographic.	Difference.	Thermometric.	Difference.
Tampa, Fla.	P.	314.1	58	5	5	63	+ 5
Galveston, Tex.	P.	313.1	45	50	+ 5	24	0
New Orleans, La.	P.	313.1	35	34	- 1	54	+ 2
Savannah, Ga.	P.	309.8	53	70	+ 7	48	0
Vicksburg, Miss.	P.	309.8	43	65	+ 7	36	- 2
Charleston, S. C.	P.	308.3	54	67	+ 13	36	- 2
Phoenix, Ariz.	P.	308.3	54	67	+ 13	36	- 2
San Diego, Cal.	P.	307.1	38	65	+ 7	50	+ 4
Atlanta, Ga.	T.	307.1	58	65	+ 7	31	- 4
Los Angeles, Cal.	P.	307.1	46	35	...	49	+ 16
Wilmington, N. C.	T.	305.8	35	40	...	46	+ 6
Chattanooga, Tenn.	T.	305.8	40	53	+ 13	...	...
Little Rock, Ark.	T.	305.0	40	60	+ 14	...	...
Nashville, Tenn.	T.	305.0	46	58	+ 4	...	...
Raleigh, N. C.	T.	305.0	40	58	+ 4	...	...
Santa Fe, N. Mex.	P.	305.0	46	58	+ 4	...	...
Fresno, Cal.	T.	303.3	50	38	...	41	+ 2
Dodge City, Kans.	P.	302.3	54	45	+ 7	...	...
Louisville, Ky.	T.	302.3	28	40	+ 7	...	...
San Francisco, Cal.	T.	302.3	43	36	...	...	...
Atlantic City, N. J.	P.	300.8	38	34	+ 4	...	...
Baltimore, Md.	T.	300.8	34	48	+ 18	...	...
Cincinnati, Ohio.	T.	300.8	30	...	...	...	...
Kansas City, Mo.	P.	300.8	30	...	...	...	...
St. Louis, Mo.	T.	300.8	30	...	...	...	...

Difference between instrumental and personal observations.—Cont'd.

Stations.	Apparatus.	Total possible duration for the whole month.	Personal estimated area of clear sky.	Instrumental record of sunshine.			
				Photographic.	Difference.	Thermometric.	Difference.
Washington, D. C.	P.	300.8	39	44	+ 5	31	+ 9
Columbus, Ohio.	T.	299.7	50	59	+ 9	52	+ 16
Denver, Colo.	P.	299.7	36	36	...	58	+ 22
Indianapolis, Ind.	T.	299.7	36	42	+ 13	...	...
Philadelphia, Pa.	T.	299.7	36	35	+ 1	55	+ 19
Cheyenne, Wyo.	P.	298.4	36	45	+ 11	38	+ 4
Eureka, Cal.	P.	298.4	34	32	+ 15	35	+ 5
New York, N. Y.	T.	298.4	36	...	...	54	+ 5
Omaha, Nebr.	P.	298.4	34	...	...	31	+ 2
Pittsburg, Pa.	T.	298.4	34	...	...	20	+ 2
Salt Lake City, Utah.	T.	298.4	17	...	...	38	+ 3
Binghamton, N. Y.	T.	296.5	30	...	...	34	+ 10
Boston, Mass.	T.	296.5	29	...	...	29	+ 7
Chicago, Ill.	T.	296.5	49	...	...	59	+ 38
Cleveland, Ohio.	T.	296.5	18	...	...	43	+ 11
Des Moines, Iowa.	T.	296.5	35	...	...	38	+ 3
Detroit, Mich.	T.	296.5	24	...	...	34	+ 10
Dubuque, Iowa.	T.	296.5	36	...	...	29	+ 7
Albany, N. Y.	T.	295.4	36	...	...	59	+ 38
Buffalo, N. Y.	T.	295.4	32	...	...	43	+ 11
Idaho Falls.	T.	295.4	17	...	...	38	+ 3
Rochester, N. Y.	T.	295.4	35	...	...	66	+ 16
Northfield, Vt.	P.	293.8	34	47	+ 13	...	...
Portland, Me.	T.	293.8	50	...	...	...	...
Eastport, Me.	P.	391.9	50	58	+ 8	...	...
Minneapolis, Minn.	P.	391.9	25	25	0	28	...
St. Paul, Minn.	P.	391.9	25	25	0	28	...
Portland, Oreg.	P.	390.4	39	...	...	21	- 4
Bismarck, N. Dak.	P.	388.7	43	53	+ 10	35	- 8
Helena, Mont.	P.	388.7	39	41	+ 2	32	+ 4
Seattle, Wash.	T.	386.8	28	...	...	...	...
Spokane, Wash.	P.	386.8	26	29	+ 3	...	...

COMPARISON OF DURATIONS AND AREAS.

The sunshine registers give the *durations* of effective sunshine whence the durations relative to possible sunshine are derived; the observers' personal estimates give the percentage of *area* of clear sky. These numbers have no necessary relation to each other, since stationary banks of clouds may obscure the sun without covering the sky, but when all clouds have a steady motion past the sun and are uniformly scattered over the sky, the percentages of duration and of area agree closely. For the sake of comparison, these percentages have been brought together, side by side, in the following table, from which it appears that, in general, the instrumental records of percentages of durations of sunshine are almost always larger than the observers' personal estimates of percentages of area of clear sky; the average excess for February, 1897, is 7 per cent for photographic and 7 per cent for thermometric records.

The details are shown in the preceding table, in which the stations are arranged according to the *total possible duration* of sunshine, and not according to the *observed duration*.

ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms are given in Table IX, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

Thunderstorms.—The dates on which reports of thunderstorms for the whole country were most numerous were: 20th, 201; 21st, 176; 22d, 187.

Thunderstorm reports were most numerous in: Illinois, 74; Kentucky, 77; Louisiana, 62; Missouri, 70; Tennessee, 63; Virginia, 68.

Thunderstorms were most frequent in: Florida and Georgia, 12 days; Louisiana, 14; Tennessee and Virginia, 10.

Auroras.—The evenings on which bright moonlight must

have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz, from the 12th to the 20th, inclusive. On the remaining nineteen days of this month 129 reports were received, or an average of about 7 per day. The dates on which the number of reports for the whole country especially exceeded this average were: 2d, 30; 25th, 23; 26th, 25, and 27th, 16.

Auroras were reported most frequently in: Michigan, 15; North Dakota, 31.

The number of reports was a large percentage of the num-

ber of observers in: North Dakota, 80; South Dakota, 20. CANADIAN REPORTS.

No thunderstorms were reported.

Auroras were reported as follows: Grand Manan, 26th; Yarmouth, 3d, 26th; St. Andrews, 25th; Father Point, 3d, 5th, 20th, 24th, 26th; Quebec, 3d, 9th, 10th, 24th, 25th; Montreal, 3d, 9th, 25th; Kingston, 26th; Winnipeg, 1st, 10th, 20th, 22d to 27th; Minnedosa, 1st, 8th, 22d to 28th; Medicine Hat, 3d; Calgary, 1st, 3d, 4th, 13th; Banff, 25th; Battleford, 1st, 7th, 14th.

CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division

The following extracts relating to the general weather conditions in the several States and Territories are taken from the monthly reports of the respective sections of the Climate and Crop Service. The name of the section director is given after each summary.

Snowfall and rainfall are expressed in inches.

Alabama.—The mean temperature was 51.0°, or 1.8° above normal; the highest was 85°, at Elba on the 23d, and the lowest, 12°, at Valley-head on the 27th. The average precipitation was 6.32, or 1.65 above normal; the greatest monthly amount, 13.53, occurred at Alco, and the least, 2.82, at Newburg. The wet weather has delayed farming operations somewhat, while the continued warm weather of the greater part of the month caused fruit trees to bloom in the southern and central portions of the State.—*F. P. Chaffee.*

Arizona.—The mean temperature was 47.3°, or 1.0° below normal; the highest was 83°, at Parker and Yuma on the 25th, and the lowest, 10° below zero, at Flagstaff on the 22d. The average precipitation was 0.69, or 0.51 below normal; the greatest monthly amount, 2.82, occurred at Pinal Ranch, while none fell at several stations.—*W. T. Blythe.*

Arkansas.—The mean temperature was 46.8°, or 3.4° above normal; the highest was 89°, at Elon on the 18th, and the lowest, 7°, at Silver Springs on the 27th. The average precipitation was 2.59, or 1.91 below normal; the greatest monthly amount, 5.80, occurred at Blackton, and the least, 0.45, at Fort Smith.—*F. H. Clarke.*

California.—The mean temperature was 48.0°, or 0.8° below normal; the highest was 97°, at Volcano Springs on the 28th, and the lowest, 24° below zero, at Bodie on the 23d. The greatest monthly precipitation was 20.14, at Morses House, while none fell at several stations.—*J. A. Barwick.*

Colorado.—The mean temperature was 25.0°, or about normal; the highest was 69°, at Lamar on the 27th, and the lowest, 34° below zero, at Hot Sulphur Springs on the 14th. The average precipitation was 1.72, or 0.67 above normal; the greatest monthly amount, 23.28, occurred at Ruby, where the total snowfall was nearly 20 feet; the least amount was 0.10, at Fort Morgan.—*F. H. Brandenburg.*

Florida.—The mean temperature was 63.0°, or 2.0° below normal; the highest was 90°, at Archer on the 21st, and the lowest, 27°, at De Funiak Springs on the 27th. The average precipitation was 6.57, which is 3.42 in excess of the normal; the greatest monthly amount, 13.23, occurred at Milton, and the least, 1.00, at Orange Park.—*A. J. Mitchell.*

Georgia.—The mean temperature was 51.3°, or 1.1° above normal; the highest was 8.3°, at Morgan on the 22d and Jesup on the 23d, and the lowest, 10° at Gainesville on the 4th. The average precipitation was 7.98, or 3.49 above normal; the greatest monthly amount, 12.43, occurred at Jesup, and the least, 4.29, at Marietta.—*J. B. Marbury.*

Idaho.—The mean temperature was 27.6°; the highest was 67°, at Lewiston on the 28th, and the lowest, 22° below zero, at Chesterfield on the 18th. The average precipitation was 2.11; the greatest monthly amount, 3.80, occurred at Ola, and the least, 0.20, at Oakley.—*D. P. McCallum.*

Illinois.—The mean temperature was 31.2°, or 2.2° above normal; the highest was 73°, at McLeansboro on the 20th, and the lowest, 12° below zero, at Scale Mound on the 27th. The average precipitation was 1.99, or 1.02 below normal; the greatest monthly amount, 5.13, occurred at Golconda, and the least, 0.69, at Bushnell.—*C. E. Linney.*

Indiana.—The mean temperature was 32.7°, or 0.8°, above normal; the highest was 71°, at Mount Vernon on the 21st, and the lowest, 5° below zero, at Angola and South Bend on the 27th. The average precipitation was 2.92, or 0.31 below normal; the greatest monthly amount, 6.25, occurred at Vevay, and the least, 1.16, at Warsaw. The weather was not favorable to growing crops, and wheat and clover are not in a

very good condition at the end of the winter, except in a few favorably located fields. Fruit buds seem to be safe so far, except peach buds, which were possibly injured much during the extended cold nights. Stock is in good condition.—*C. F. R. Wappenham.*

Iowa.—The mean temperature was 24.6°, or 2.4° above normal; the highest was 61°, at Council Bluffs on the 16th, and the lowest, 24° below zero, at Algona and Spirit Lake on the 26th. The average precipitation was 0.88, or 0.54 below normal; the greatest monthly amount, 1.90, occurred at Hawkeye, and the least, 0.22, at Ames.—*G. M. Chappel.*

Kansas.—The mean temperature was 33.5°, or 1.7° above normal; the highest was 77°, at Hutchinson on the 21st, and the lowest, 8° below zero, at Garden City on the 15th. The average precipitation was 1.16, or 0.13 above normal; the greatest monthly amount, 3.45, occurred at Columbus, and the least, "trace," at White Rock. Much of the precipitation was in the form of snow, which was very wet, and falling with but little wind, no drifting occurred; this wet snow, lying as it fell, melting and soaking into the ground, very nearly produced a mud blockade, but was of inestimable value to the State, putting the ground in better condition for the time of year than it has been for some years.—*T. B. Jennings.*

Kentucky.—The mean temperature was 39.8°, or 2.0° above normal; the highest was 76°, at Middlesboro and Williamsburg on the 22d, and the lowest, 8°, at Blandville and Mount Sterling on the 27th. The average precipitation was 5.75, or 1.79 above normal; the greatest monthly amount, 8.86, occurred at Southfork, and the least, 3.02, at Pilot Oak. During the greater portion of the month conditions were favorable for all agricultural interests at this season, and some early plowing for spring work was begun.—*Frank Burke.*

Louisiana.—The mean temperature was 55.1°, or 0.6° above normal; the highest was 89°, at Cheneyville on the 20th and 21st, and the lowest, 24°, at Robeline on the 2d. The average precipitation was 4.25, or 0.40 below normal; the greatest monthly amount, 9.92, occurred at Donaldsonville, and the least, 0.43, at Shreveport. The month lacked sunshine, cloudy weather and easterly winds prevailed during a goodly period; despite this important drawback the close of the month shows farm work progressing over the greater portion of the State, with peach and plum trees in bloom, and the forest trees putting on their spring verdure.—*R. E. Kerkam.*

Maryland.—The mean temperature was 34.8°, or 2.0° above normal; the highest was 63°, at Charlotte Hall on the 17th, and the lowest, zero, at Flintstone on the 1st. The average precipitation was 5.43, or 2.32 above normal; the greatest monthly amount, 9.17, occurred at Sunnyside, and the least, 3.53, at Mount St. Marys.—*G. E. Hunt.*

Michigan.—The mean temperature was 23.6°, or 2.0° above normal; the highest was 54°, at Midland on the 20th, and the lowest, 43° below zero, at Humboldt on the 26th. The average precipitation was 1.26, or 0.69 below normal; the greatest monthly amount, 3.23, occurred at Benton Harbor, and the least, 0.29, at Iona. So far as can be determined, fall-sown crops and fruit buds are in good condition.—*C. F. Schneider.*

Minnesota.—The average temperature was 15.3°, or 2.8° above normal; the highest was 48°, at Luverne on the 3d, and the lowest, 50° below zero, at Leech Lake Dam on the 25th and Pokegama on the 28th. The average precipitation was 1.21, or 0.52 above normal; the greatest monthly amount, 3.00, occurred at Mount Iron, and the least, 0.10, at St. Peter. It is probable that over the whole State the average depth of snow on the ground ranges from 9 to 30 inches, but in the forests it is said to lie fully 4 feet deep. Railroad traffic has been very seriously hindered, especially in western portions of the State, where the roads have been blocked for days at a time.—*T. S. Outram.*

Mississippi.—The mean temperature was 52.4°, or 2.0° above normal; the highest was 87°, at French Camp on the 7th, and the lowest, 18°, at Columbus, Fulton, and Holly Springs on the 27th. The average precipitation was 4.17, or 1.14 below normal; the greatest monthly amount, 8.05, occurred at Mossport, and the least, 1.24, at Thornton. The absence of any decided cold waves during the month encouraged